R-2000
STUDENT DESIGN CHALLENGE
1986-1987

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Ontario Ministry of Energy

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MESSAGE FROM THE MINISTER

Mr. Kerrio and a model of this year's winning design.

MESSAGE FROM THE MINISTER

As Minister of Energy for Ontario, I am delighted by the continued success of the R-2000 Student Design Challenge, now in its second year. I would again like to thank the competition's co-sponsors, Fiberglas Canada and Select Home Designs, for their renewed commitment to this project, and also recognize the participation of the Canadian Home Builders' Association, the pioneer of the R-2000 standard of housing energy efficiency.

Energy-efficient housing can make a valuable contribution to Ontario's efforts to reduce energy consumption. It is a simple fact that, given today's technology and resources, most homes continue to be relatively inefficient. Designing and building more R-2000 homes will help change that.

As evidenced by last year's R-2000 Student Design Challenge, Ontario's architecture and architectural technology students are very aware of the importance of energy-efficient home designs. The 350 students who participated this year have shown a keen interest in this field. I think you will agree that the Challenge has inspired them to reach new heights in design excellence.

The 11 winning designs in this book demonstrate that *any house* can be designed and built to the R-2000 standard of energy efficiency, whatever your taste or budget. Wherever you live in this province, you could be the owner of an R-2000 home – a home that is comfortable, affordable and above all, energy-efficient.

Choosing the winners from this year's entries was a difficult task. We were excited by the ingenuity and creativity exhibited in these submissions, and this book contains the best examples of what the future holds for R-2000 home-buyers.

My congratulations to the winners. Their enthusiastic participation serves to promote the important role our future architects will play in shaping the Ontario of tomorrow.

I hope the 1986/1987 Design Challenge provided these students with an opportunity for personal growth and professional insight, and that it will help them to become innovators in the design of energy-efficient homes. These qualities will benefit us all in the years ahead.

Vincent G. Kerrio

Honourable Vincent G. Kerrio
Minister
Ontario Ministry of Energy

SELECT HOME DESIGNS

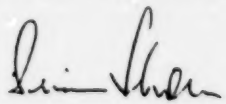
A home is the most important investment many individuals will make in their lifetime. The R-2000 building system, the focus of the R-2000 Student Design Challenge, is a major step towards creating a better investment for each and every new home buyer, while slowing the drain on the world's energy resources.

Designing a home is a challenge in itself. Add to that challenge the disciplines of energy efficiency, as well as the highly competitive nature of today's housing market, and you begin to realize that the participants in this competition required maximum creativity and innovation to produce a product that will appeal to the nation's homebuilders, as well as discriminating and informed buyers.

The purpose of the R-2000 Student Design Challenge is to make energy conservation feasible, and at the same time to design homes that are attractive, acceptable, affordable, and responsive to the increasingly complex needs of the Canadian homeowner. The award winners have produced designs which satisfy these needs.

On behalf of Select Home Designs' management and staff, I offer my sincere congratulations to each of the winners. To the dozens of students who wrestled with the complex equations of practice and theory, creating and submitting ideas that may someday help to shape the Canadian housing industry, thank you all for your participation.

The Ontario Ministry of Energy and Fiberglas Canada deserve a great deal of credit for sponsoring and encouraging a competition that inspires us all to greater heights in the technology of home design and construction.



Brian Thorn
President
Select Home Designs

FIBERGLAS CANADA INC

The R-2000 Student Design Challenge affords the students of Ontario's universities and colleges a unique opportunity to be at the forefront of building science. The evolution of residential construction in Canada towards super energy efficiency is putting our country in commanding position to become a world leader in the technologies required to design and build superior building envelopes and heating/ventilation systems.

Fiberglas Canada Inc. is delighted to be a co-sponsor of the Design Challenge, along with Select Home Designs and the Ontario Ministry of Energy.

A basic tenet of our company is that we must continually search out, and nurture, bright and fresh ideas. Where better to look for them than in the minds of Ontario s architectural and design students?

The R-2000 program was established not only to encourage the building of super energy-efficient housing, but to stimulate innovation at the same time. Design competitions, almost by definition, are forums for innovative ideas. The submissions received by the judging committee reflect an exciting level of involvement and intelligence on the part of each student and design team.

Our congratulations to all involved in the competition.

F.W. Henkelman
President & Chief Executive Officer
Fiberglas Canada Inc.

THE DESIGN CHALLENGE

In retrospect, it was an ambitious undertaking. The idea was to get students from all across Ontario to focus their architectural talents on an R-2000 home design competition. The goal was to create greater R-2000 awareness in Ontario's young designers, and to come up with more R-2000 home designs for Ontario builders.

For several years, both the Ontario and federal governments have been encouraging builders to construct more R-2000 homes. But there was a problem: The demand for energy-efficient R-2000 home designs from builders far outweighed the existing supply of plans.

To provide an incentive for the design of such homes – and to educate the province's future architects and designers – the Ontario Ministry of Energy, Fiberglas Canada and Select Home Designs decided to issue the R-2000 Student Design Challenge.

The competition invited all full-time architecture and architectural technology students from Ontario's universities and colleges to submit their original R-2000 designs. Everyone agreed that it was a great idea – but putting it together required a great deal of hard work by hundreds of people.

HOW IT ALL GOT STARTED

Before the competition got under way, an advisory committee of professionals in the architectural and building industry was assembled to iron out the logistics and criteria involved in staging a provincewide design contest. The committee formulated the rules and regulations regarding the submissions, and the standards which were eventually used to judge all the entries.

The committee members were Charles Simon, of Simon Architects and Planners; E. Tannis, of the Ontario Ministry of Colleges and Universities; Andrew Zdanowitz, of the Ontario Ministry of Municipal Affairs and Housing; Christine Smith, of the Canadian Housing Design Council; Fanis Grammenos, of Canada Mortgage and Housing Corporation; Grant R. McDiarmaid, of Fiberglas Canada Inc.; and Stephen Williams, of Select Home Designs.

Ministry of Energy staff were given the task of gathering input and support from architecture and design department personnel at the province's colleges and universities, and working out the details of including the R-2000 Student Design Challenge as part of the students' curriculum.

The 1986-87 Design Challenge drew entries from 11 of the 14 eligible schools in Ontario. In all, a total of 350 architecture and architectural technology students took part – representing Algonquin College and Carleton University in Ottawa; Confederation College in Thunder Bay; George Brown College and Humber College in Toronto; Mohawk College in Hamilton; Northern College in South Porcupine; Ryerson Polytechnical Institute in Toronto; St. Clair College in Windsor; Sault College in Sault Ste. Marie; and the University of Waterloo in Waterloo.

The Design Challenge appealed to the schools, and to both teachers and students. Schools were able to add a new dimension to their architectural programs and teachers were better able to help students understand the building and design techniques used to achieve the R-2000 standard. For students, the challenge provided an opportunity to see how their design talents stacked up against those of their peers in the province.

THE AWARDS PRESENTATION

JUDGING THE ENTRIES

Eleven winning designs from eight schools were selected by the panel of judges. The decisions were based on several key factors:

- the designs had to meet the R-2000 standard of energy efficiency in new home construction;
- the plans had to be for a detached home;
- the houses had to be practical to build, marketable and economical;
- the construction materials and techniques had to ensure long-term reliability and low maintenance; and,
- the homes had to be affordable for an average-income family.

THE AWARDS

The prizes awarded were provided by the competition's co-sponsors, Select Home Designs of Vancouver, and Fiberglas Canada Inc.

Select Home Designs offered part of the top prize – two four-month student apprentice positions at the company's prestigious head office in Vancouver.

Fiberglas Canada contributed a total of $25,000 in bursaries to the winning schools: $10,000 to the first place winner's school; $5,000 to the second; $3,000 to the third; $5,000 to be divided among the five Honorable Mentions; and $500 each for up to four Citations.

THE WINNERS

First Place – James Cripps, Donald Hall and David Lalama, Ryerson Polytechnical Institute

Second Place – Robert Aitken and Benny Choy, Mohawk College

Third Place – Dominic Battistel, Garth Goode and Glen Herglotz, Ryerson Polytechnical Institute

HONORABLE MENTIONS

1. Benny Domingos and Dusan Lukic, George Brown College
2. Joseph Cheung and Attila Fogarasi, George Brown College
3. Peter Haats, Humber College
4. Greg Philip, Sault College of Applied Arts & Technology
5. Bob Sims, University of Waterloo

CITATIONS

1. Alain Lavoie, Algonquin College
2. Tinh Nguyen, Algonquin College
3. Bill Mason and Louis Mailloux, St. Clair College

WHAT MAKES R-2000 HOMES SO DIFFERENT?

The students who rose to the Challenge had to design homes that measured up to the rigorous R-2000 standard of energy efficiency. R-2000 homes can vary widely in size, design, and price, but they all share some common features.

The R-2000 house is virtually draft- and dust-free; it has even humidity levels; it utilizes more heat from the sun; it's cooler in the summer and warmer in the winter. As well, the same features that prevent heat and cold from entering the house also keep out noise. The homes contain a continuous air/vapor barrier, high insulation levels, well-sealed doors and windows, and efficient heating systems. Because of its special construction, each R-2000 house requires a controlled ventilation system that ensures comfortable humidity levels and fresh air all year round.

The R-2000 home design must also conform to the strict standards of the HOTCAN computer program. HOTCAN analyses the design's energy-efficiency by rating the building materials used, the overall size of the planned house, the projected insulation requirements, and even the weather patterns of the area where the house is to be built. If the plans don't measure up to HOTCAN, it's not an R-2000 home!

After construction, the ultimate test for an R-2000 home is the air-leakage test. A heavy-duty fan puts the house under pressure to test for air-leakage – no more than 1.5 complete air changs per hour are allowed, at a specified pressure differential of 50 Pascals. Until the house passes the test, it can't receive the official R-2000 designation from the Government of Canada.

HOW R-2000 GOT OFF THE GROUND

The R-2000 standard of energy efficiency wasn't invented overnight. Great strides were made in the low-energy housing industry as a result of the oil price shocks of the 1970s, but early ideas for energy-efficient homes were around as far back as the 1920s.

In those early years, Professor A.R. Grieg, of the University of Saskatchewan, established a laboratory to study the effects of heat loss on various insulating materials. Saskatchewan was a logical place to continue the studies and build prototype homes, because of the extremely cold winters, and the fact that many existing homes at the time were modelled after poorly-insulated European homes.

Over the years, Grieg's pioneering work was carried on by others – builders, developers, universities, the Canadian Home Builders' Association, manufacturers, and government agencies such as the National Research Council and the Canada Mortgage and Housing Corporation.

By the early 1970s, many existing low-energy housing projects were suddenly getting a lot more notice. Government, consumers and industry began to agree that one of the best and most effective ways to reduce energy consumption was to reduce the amount of energy used to heat Canadian homes.

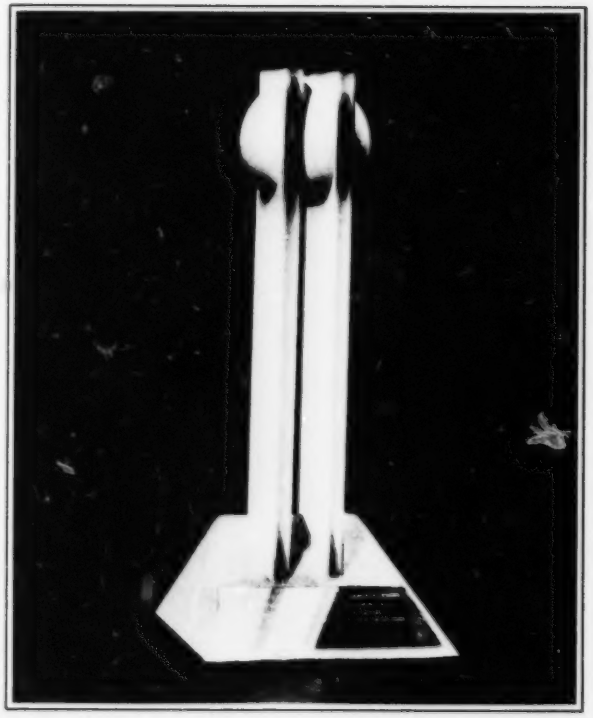
The existing demonstration homes provided a good basis for the industry to study details such as insulation levels, construction methods, low-energy design and new materials. The result of these intensive efforts was the R-2000 standard of home energy efficiency – a standard that can reduce home heating costs by up to 70 per cent.

THE TROPHY

The R-2000 Student Design Challenge trophy was designed in 1986 by James Bruer, Vincent Somoza and Scot Laughton, students of the Ontario College of Art's Industrial Design department.

The materials used for the sculpture – the green glass, aluminum orb and concrete base – are all materials used in the building trade, and were selected to symbolize both the elements of energy efficiency and the efforts of builders and architects.

The triangular concrete base is interpreted as the home's foundation, while the glass supports have a dual symbolism: They represent both the structure of a house and conduits for energy from the aluminum orb, which represents the sun and warmth.



THE JUDGES

JEREMY JENKINS, B. Arch., this year's chairman of the R-2000 Student Design Challenge, graduated from the University of Toronto in 1967. He spent the next two years travelling the world, looking at architecture, and then taught for two years at the Ryerson Polytechnical Institute in Toronto. In 1971, he founded Shelter Construction and Development, which now lists, among its many credits, the design and construction of energy-efficient churches, apartments and houses in three-quarters of the towns in the Northwest Territories, and the creation of an entirely new town in remote northeastern Quebec.

Over the past few years, Shelter Construction has expanded into the Carribean, designing and building 24 houses in the Turks and Caicos Islands. In the early 1980s, in conjunction with the Ministry of Energy, Mr. Jenkins designed and managed the construction of 10 new energy-efficient houses, and did major energy retrofits to five existing homes, in the Northern Ontario town of Armstrong. Mr. Jenkins has also designed and built a number of low-energy homes in southern Ontario.

CHARLES SIMON, OAA, RAIC, established Simon Architects and Planners in 1970. Since then, Mr. Simon's work has been recognized by numerous design awards and journal articles. His reputation in the field of energy-efficient building and site planning has resulted in invitations to speak to professional organizations across North America and Europe.

Mr. Simon's firm has undertaken energy-efficient design research in Canada for the federal and provincial governments, and the home building industry.

Mr. Gren Parcher, Ontario Home Builders' Association

THE JUDGES

DOUG GEDDES, P.Eng, is Manager of Technical and Educational Services for the Heating, Refrigerating and Air Conditioning Institute (HRAI), the national trade association for these industries. Mr. Geddes had a background in teaching and marketing prior to joining HRAI. He has written several technical manuals and serves on many government and industry committees.

Mr. Steve Riley, Select Home Designs, Canada

GREN PARCHER of Kingston, Ontario, is one of Canada's most successful builders of R-2000 homes. He entered the building industry in 1975, after working 15 years in the engineering department of Dupont Canada. Mr. Parcher has complemented his success as a builder with his tireless and varied service to the home building industry as a whole. He has taken on a number of volunteer duties – he is a past vice-president of the Ontario Home Builders' Association; a former member of the OHBA's Financial Planning Committee; and past president of the Kingston Frontenac Home Builders' Association. Besides building R-2000 homes, Mr. Parcher's involvement includes the countless hours he has spent as both a member and chairman of R-2000 committees and task forces. He has served as an R-2000 instructor and is currently the OHBA's senior R-2000 design evaluator; an R-2000 inspector; and chairman of the R-2000 Technical Advisory Committee. His engagements as a building science lecturer have taken him across Canada and throughout the United States.

STEVE RILEY is the National Manager of Design Services for Select Home Designs, Canada's leading home planner. Mr. Riley designed the 1985 R-2000 Model Dream Home for the National Home Show in Toronto. In 1986, Mr. Riley won the B.C. Place Dream Home '86 design competition in Vancouver.

F I R S T P L A C E

JAMES CRIPPS
DONALD R. HALL
DAVID F. LALAMA

All three are students in the Architectural Sciences program at Ryerson Polytechnical Institute in Toronto. They call their group Design on Tap.

JAMES CRIPPS was born in Windsor, Ontario. His architecture studies have included a stint at the University of Waterloo, and his goal is to obtain a Master's degree in architectural design. He is also an artist and a martial arts enthusiast.

DONALD R. HALL was born in Toronto, raised in Sundridge, Ontario, and moved back to Toronto to attend Ryerson. For the last three summers, he has worked in architectural offices in Toronto and London, Ontario. He also has his own freelance design company, and is aiming toward a future in the project management side of architecture. His travels have taken him throughout eastern Canada, the northeastern United States and, recently, to Phoenix, Arizona, for an American Institute of Architectural Science convention. An avid fisherman, he spends a week each May in Algonquin Park.

DAVID F. LALAMA, a native of Welland, Ontario, has been studying architecture at Ryerson for the last four years and intends to enter the Master's program this fall. He has worked for architectural firms in the St. Catharines area, does freelance work and is employed as a guitar player in a weekend band. As for his future, he says: "I'd like to further my studies in energy-efficient and computer-aided design, and eventually become involved in developing and project management."

DESIGN NARRATIVE

ARCHITECTURE

"Our goal was to design a contemporary subdivision home that included both historical elements and progressive styles of modern architecture. This blending of ideas, we believed, would be very marketable in the Toronto area.

"On the exterior, these features include brick soldier courses, typical of older Ontario homes, and gable roofs. The landscaped walkway and entrance veranda create a very pleasing transition from street to home.

"The interior is a reflection of today's professional family needs and the family ideals of the past. The central bay acts as a street for information, services and movement.

"The hub of this central bay is an information centre, where calls, messages and a personal computer help to maintain the modern family's life style. The kitchen and informal dinette overlook a spacious, well-planned back yard. The family room is the informal gathering area and overlooks the back yard through the sun space, which is in effect an extension of the family room to the exterior.

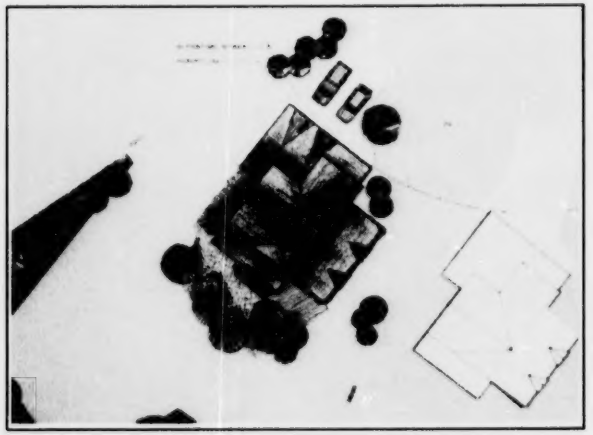
"The second floor is an efficient use of space to accommodate the private sector of family life. Each child is provided a study alcove, which is a result of both the need for such a space and the building's orientation for solar contribution. Having the laundry room on the second floor eliminates the transfer of laundry outside the realm in which it is produced. This room also doubles as a hobby/work room for parents and children. The master bedroom and adjacent en suite provide the luxury and privacy often requested by home buyers.

F I R S T P L A C E

PERSPECTIVE VIEW

SITE PLANNING

"The site, and how the building relates to it, was a critical determinant in our calculations of energy consumption, solar access and protection from harsh weather. Dense coniferous trees are located on a berm in a staggered formation at the northwest corner of the site, providing a weather break to moderate the prevailing northwest winds. Deciduous trees at the south end of the house provide shading and sun control. The design also incorporates a sun porch at the south end of the house with a maximized southern back yard area, to ensure unobstructed solar access. The landscaping of the back yard also forms several interesting spaces.



SITE PLAN

ENERGY-EFFICIENT DESIGN

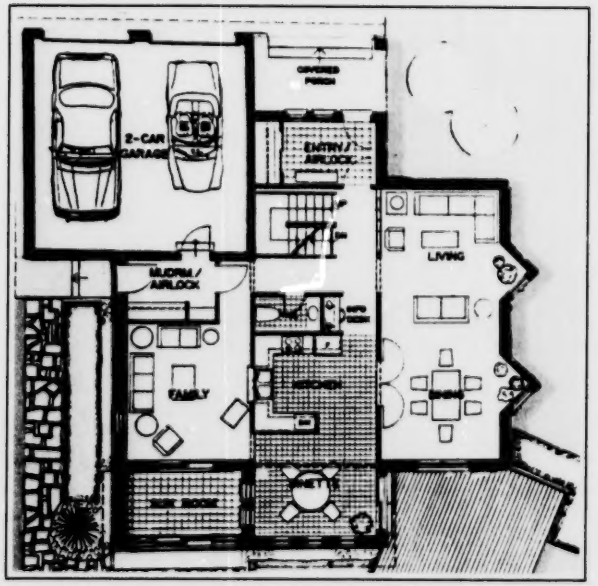
"The HOTCAN computer program was used as a design tool, rather than just a mechanical check to see if the house was within its energy budget. Thus, the program helped determine the building s shape and orientation, window sizes and orientation, and overhang widths.

"We were determined to use as much passive solar energy as possible to heat the home, without causing overheating and other uncomfortable conditions. In the end, we did just that by providing a significant solar heating contribution, while keeping glass areas to a minimum. It was simply a matter of including an unheated sun space and varying window sizes and overhangs. We rejected the idea of attaching large sun spaces and thermal storage tanks, trombe walls and the like, because of their extreme expense.

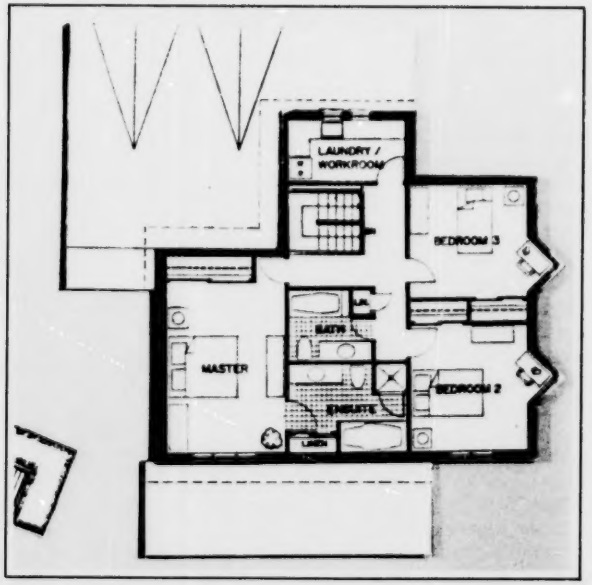
"In addition to its architectural significance, the sun space provides an excellent source of passive solar energy. The floor acts as a thermal mass for the storage of solar heat. And when it is heated, the sun space can send heat to the rest of the house via a sliding glass door or two hopper-style windows in the family room. If it gets too warm, two hopper-style windows in the exterior wall of the sunspace can let excess heat out.

"The house was oriented so that approximately 70 per cent of its glazing lies within the arc of 22.5° due south. Hence, according to the HOTCAN program, they are considered south-facing. This careful building and window orientation resulted in an annual solar heating contribution of 44 per cent and significantly reduced winter fuel costs.

"The shape of the house was itself a design decision based on energy efficiency (as well as market research). A two-storey house was chosen because it provides a smaller ratio of external surface area to inside volume. To get the same heating costs in a split-level house, or a bungalow with similar living areas, would require greater construction costs.



FIRST FLOOR PLAN



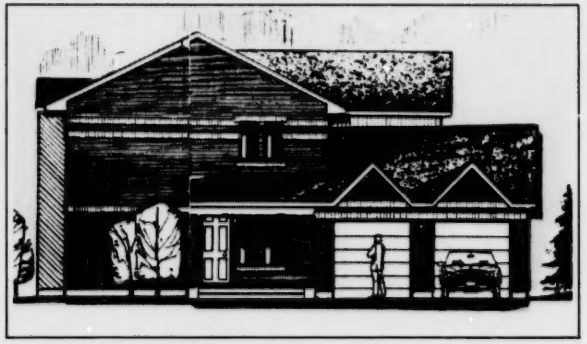
SECOND FLOOR PLAN

CONSTRUCTION TECHNIQUES

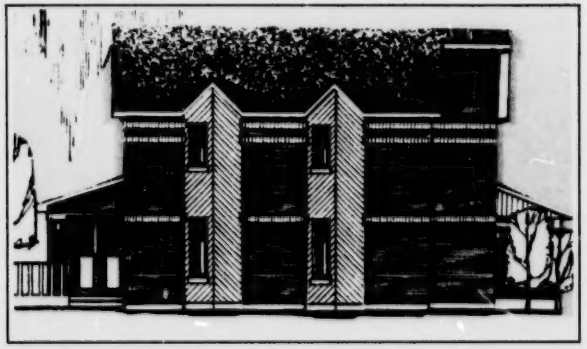
"One of our chief goals was to show that R-2000 homes can be easily built, using very simple construction methods and standard materials. Thus, we chose to establish a grid with bays approximately 3.5 metres wide. This allowed us to use 38 x 184 mm floor joists throughout the house, which reduced costs and made for simple and expedient construction. The grid system also provides an ideal situation for both vertical and horizontal distribution of the mechanical and ventilation systems.

"The basic wall construction consists of brick veneer, (for its durability and low maintenance), Glasclad sheathing, (for its high insulating value and easy installation), and a double-stud wall filled with Fiberglas batt insulation. A polyethylene vapor barrier is placed between the stud walls and is not penetrated by any of the electrical wall receptacles. Rigid insulation is incorporated in the header spaces and caulked all around to keep the vapor barrier continuous.

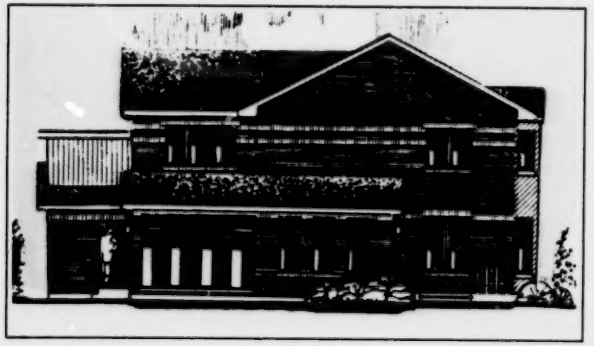
"We chose double-glazed windows with an R.S.I. value of 0.38, as provided by the HOTCAN program, instead of specifying super-insulated or triple-glazed windows. Once again, our intent was to show that we did not have to purchase expensive materials to build an energy-efficient house. Careful building and window orientation does away with the added costs of "special" windows. Therefore, the home buyer or contractor can purchase almost any quality double-glazed unit, (depending on current prices), and still be assured that our house will come under budget.



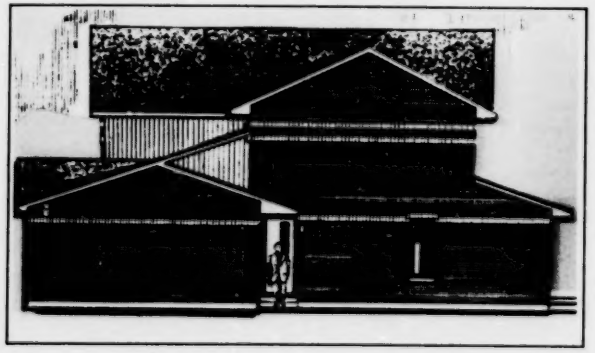
NORTH ELEVATION



EAST ELEVATION



SOUTH ELEVATION



WEST ELEVATION

MECHANICAL

"Design of the mechanical systems was based on economics and efficiency. The gas furnace provides a very economical and efficient means of heating, as the cost of gas is substantially lower than that of oil or electricity. The distribution of heated air is, wherever possible, directed horizontally across the floor, allowing a more efficient means of heating and circulating the air. The air returns have been designed to pull the air from the tributary bays into the central bay for recirculation."

JUDGES' CRITIQUE

This was unanimously chosen as the best after the initial analysis and a brief discussion.

The design, presentation, working drawings and mechanical system were all excellent.

Since the HOTCAN was under budget, more windows could have been added - perhaps in the living room and the third bedroom. This could also have improved the exterior appearance of the house, which was a bit plain from the north, or street side, due to the dominance of the garage. Buildability could have been improved perhaps by making bay windows instead of zigzagging the basement foundation under several windows.

SECOND PLACE

ROBERT AITKEN
BENNY CHOY

Students in the Architectural Technology program, Mohawk College, Hamilton.

After graduating from high school and before enrolling at Mohawk, ROBERT AITKEN spent nearly four years working as a laborer in the house-construction industry, doing mainly rough framing. He now has a drapery installation business. His interests include golf, skiing and windsurfing, and he intends to start a building business soon after his graduation from college.

BENNY CHOY, a recent immigrant from Hong Kong, has won many scholastic honors, worked as a junior technologist/ draftsman in a Toronto architecture firm, and sold electrical appliances in Lima, Peru. He lists his hobbies as reading, drawing, travel, tennis and meeting people.

DESIGN NARRATIVE

THREE ASSUMPTIONS

"The site is located in Toronto and local materials and subtrades are to be used. The south side of lot No. 19 is free from the shadows of adjacent buildings. The design must fit in every lot without substantial dimensional and layout changes.

STREET SCAPE

SITE

"Coniferous trees are staggered along the north and northwest edges of the lot to block prevailing winds and snow. Deciduous trees are placed along the south edge to block the summer sun and allow winter sunlight into the house. Coniferous and deciduous trees on the west side of the lot provide privacy.

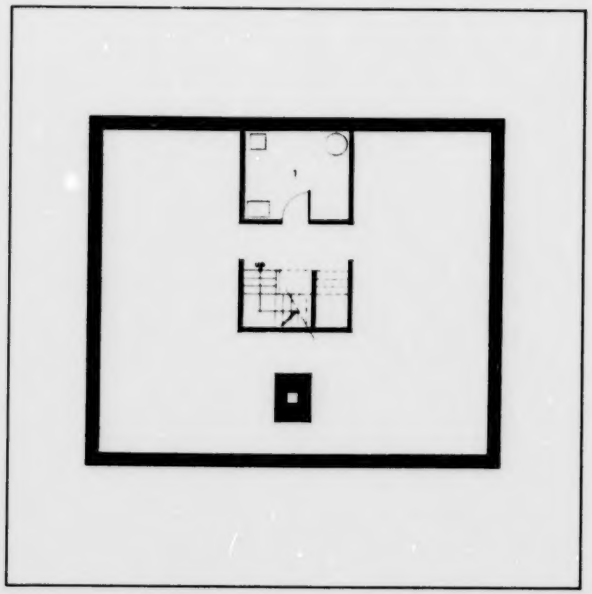
"The entire site is covered with grass or sod to reduce glare and radiation, which is especially important for the southern part of the lot. The orientation of the house is as close to the west-side lot line as possible. The garage is at the front of the house to block prevailing winds and help insulate the den and living room.

ARCHITECTURAL ASPECTS

"A two-storey design provides maximum space with minimum wall area. A two-storey house also has less building area, which allows for more landscaping.

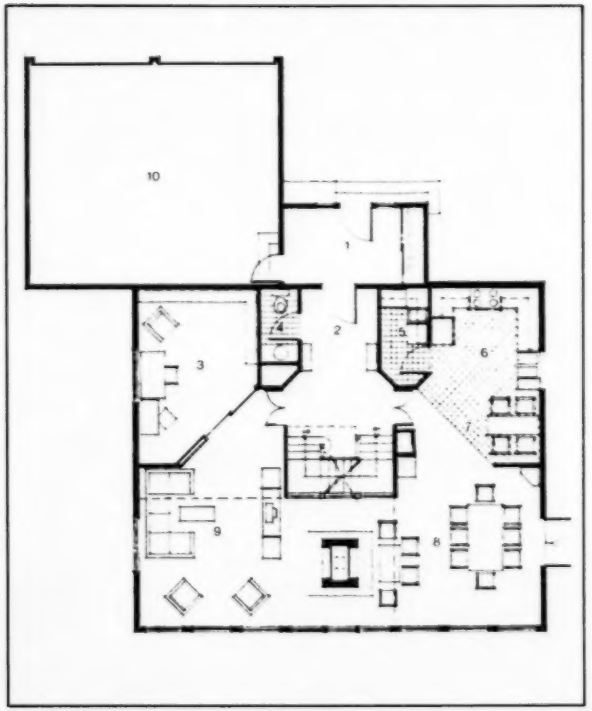
"Slate or ceramic tile can be installed on the living and dining room floors to help store heat from winter sunlight. A brick fireplace has been added for additional heat storage and marketing purposes. The trellis-style window overhang helps prevent overheating in summer. Northern glazing has been kept to a minimum. West- and east-facing windows provide cross-ventilation for summer cooling.

"Insulated shutters can be used at night to prevent loss of heat stored during the day. Stairwell openings in the bedrooms and the cathedral ceilings allow better air and heat circulation.



BASEMENT PLAN

SECOND PLACE



FIRST FLOOR PLAN

SECOND FLOOR PLAN

SECOND PLACE

INTERIOR FUNCTIONAL ORGANIZATION

"Rooms requiring less heat are located on the north part of the floor plan and are denoted as Area A. Rooms requiring more heat and light are on the south part of the floor plan and are denoted as Area B.

"Much of the heating in Area A is provided by household appliances and the hot water in the kitchen and washrooms. Winter sunlight contributes a significant portion of the heating in Area B.

"The centrally-located stairwell facilitates the circulation of household traffic and, with its south-facing portion open to the living/dining area, acts as an air shaft to the second floor. The stairwell also allows natural light to penetrate to the foyer. Interior partitions are minimized to allow maximum natural light penetration and air circulation.

"The closets are located along the north side, to take advantage of the insulation value of clothing. An unheated, uninsulated vestibule provides entry from both the outside and the garage; and, again, closets are positioned to take advantage of their insulation value.

CONSTRUCTION TECHNIQUES

"The use of such thermally conductive materials as masonry and aluminum is minimized. The heavy six-millimetre vapor barrier completely encases the house, including the basement. The ducting is contained within the vapor barrier in the dropped ceiling spaces. To minimize labor costs, conventional construction techniques are used.

MECHANICAL SYSTEM

"The forced-air electric furnace and the supply and return air ducts act as an interior climate-control system. An electric furnace was chosen, because of the rising cost of natural gas and oil. The heat recovery ventilator uses air exhausted from the bathrooms, laundry and kitchen to preheat fresh air. The centrally located mechanical room simplifies the duct work layout."

JUDGES' CRITIQUE

In the initial judging, this design was very close to first place. The presentation was attractive and the photographs of the model certainly added to the appeal.

The design and the floor plans were very simple, quite attractive and livable. The wood siding is acceptable in many segments of the market today. Perhaps more windows on the north side would have improved the street-side appeal.

Combustion air details were not shown for the fireplace. High wall diffusers might have worked better than what was shown. The connection from the ventilation to the heating system was not ideal. Summer solar control seemed to be well thought out.

THIRD PLACE

DOMINIC M. BATTISTEL
GARTH B. GOODE
GLEN S.F. HERGLOTZ

This three-man team is from the Architectural Science program at Ryerson Polytechnical Institute, Toronto.

DOMINIC BATTISTEL, of Thunder Bay, Ontario, has worked in the construction industry and has travelled throughout central Canada, the U.S. Midwest, northern Italy and Yugoslavia. His interests are drawing and sports. Following graduation from Ryerson, he intends to tour Europe and someday attend graduate school in the United States.

GARTH B. GOODE was born in Prince Rupert, B.C., and grew up in Northern Ontario. He has been employed in engineering, planning and commercial interior design offices, and his freelance work has involved renovation, landscaping and presentation drawings. "After graduation," says Goode, "I intend to work to save some money to attend graduate school in the United States and tour China." So far, his travels have been in Western Canada and to the southern U.S.

GLEN HERGLOTZ is a Toronto native, and has traveled widely in Europe. His intersts are the jazz trumpet and sports, including intramural hockey. Like Garth and Dominic, he is also planning to attend graduate school.

PERSPECTIVE VIEW

DESIGN NARRATIVE

ASSUMPTION

"Market research has shown that most R-2000 home buyers are usually well-educated professional couples with young families purchasing their second home. They understand and accept the higher construction costs required by an R-2000 design. Their income is slightly above average. Thus, some luxury features, as well as energy efficiency, are highly desirable in homes designed for this target market.

"The research also shows that passive solar heating is a feature that offers an early return on investment.

"When people spend extra money on a quality R-2000 home they expect an attractive home with a thermally balanced building envelope that has an advantageous payback period – characteristics normally considered to be above the minimum requirements of the HOTCAN guidelines and more costly to the builder.

"With regard to the HOTCAN specifications, the R-2000 Student Design Challenge Handbook states that an unheated sunspace, with no overhang, allows windows inside this space to be entered into the computer program as if they had no overhang. Therefore, it was assumed that if there was an overhang, it should be ascribed to the windows inside that space. Also, the program accepts only 10 window values and crashes if more are entered, so it was necessary to double up similar windows on the south side for the HOTCAN calculation.

SITE

"The site chosen was lot No. 20, which has the garage and neighboring house positioned to shelter the home from the west and northwest winds prevalent in the Toronto area in the winter. In addition to their aesthetic value, the trees and shrubs will deflect some of the north wind. To minimize snow drifting across the driveway, the trees along the west side were not continued to the end of the property. During the summer, cooling south and southwest winds are funnelled toward the south face of the building by the deciduous trees. These trees also prevent direct sunlight from entering the lower windows. The upper windows on the south side are shaded by the roof overhang. During the winter, the deciduous trees lose their leaves and allow the sun to shine into the house and sunroom, contributing passive solar heat and helping to minimize the fuel bills.

"The pressure-treated wood deck at the back of the house reflects the 45 degree projection and is kept unstained to co-ordinate with the color concrete brick soldier course.

"The address signage is illuminated to make it more visible from the street. Varying combinations of landscape materials will differentiate the residences in the area. The landscape elevations are designed with a hierarchy of foliage to enhance the building. The back-yard paving stone pattern is intermittent, and the low junipers contrast with the large rock on the southwest side of the house to provide a point of interest that makes good use of its location and leaves the remainder of the yard open.

ARCHITECTURE

"The exterior brick cladding features a soldier course, which is a traditional aspect of Ontario housing design presented in a contemporary manner. The painted projected wood panel helps to emphasize this detail. And brick cladding in itself is a highly marketable feature in the Toronto area. At the 45 degree projection, the wood panel follows the roof slope to emphasize the horizontal characteristic of both the soldier course and the wooden panel. The chimney provides an interesting vertical contrast to the horizontal layering.

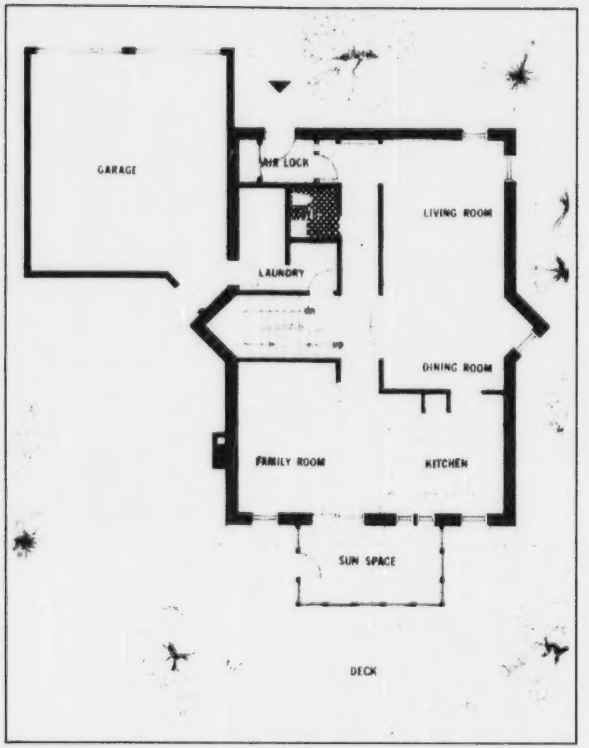
"The glass block window in the garage allows distorted light to filter in. It also adds an artistic component to a plain wall.

"The exterior of the sunroom is finished in the same painted board as the projected panel, thus providing continuity to the exterior facades. The sunroom amalgamates the interior living space with the back yard.

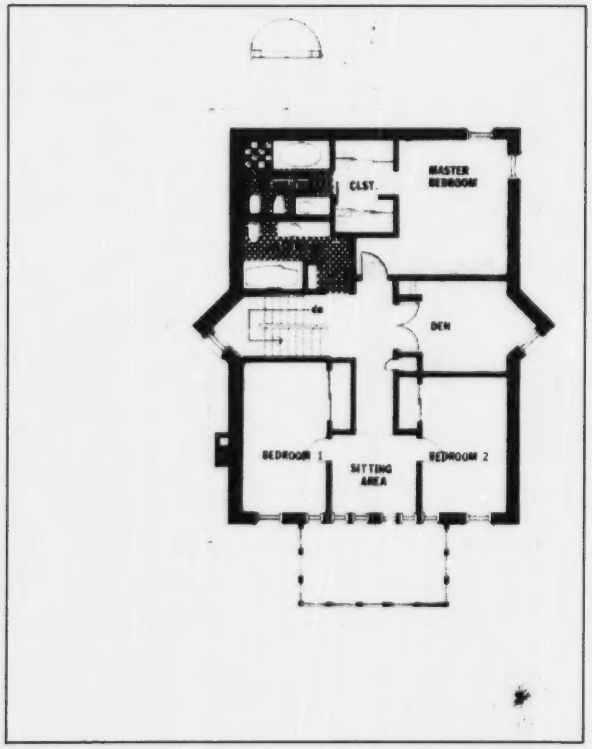
"The steep, pitched roof gives the house a dynamic appearance at street level – and lends the attic potential for conversion into a large loft.

"Entry to the house is through a vestibule that acts as an air lock. The area is large enough for the entry and closet doors to swing freely without congesting the space. A glass door with a side light provides a view into this space and out into the living room. The secondary entry through the garage provides a sheltered access to the house. The garage entrance, in combination with the laundry room, is another air lock.

"Having the bathrooms and laundry in one main area of the house makes good economic sense, because less plumbing is required.



FIRST FLOOR PLAN



SECOND FLOOR PLAN

The entry hall provides a view through the house and sunroom to the back yard. The curved glass block wall across from the stairwell penetrates the hall to help break up its length. The glass wall also allows sunlight to infiltrate from the stairwell window through to the dining/living room area. The key to good living is quality of the living space, and such small details can make a major difference. An illuminated stained glass mosaic can be seen from the south end of the hall, providing a point of interest. This could have been done with a window, but there is a high energy loss through north windows.

"An angular breakfast nook makes for a larger kitchen and supplies ample counter space for people using either a conventional or microwave oven. The family room is open to the kitchen, so a mother can keep an eye on her children while she works.

"The sunroom is projected out from the house and is not mechanically heated. The space is a full two storeys high, with a cathedral ceiling. Full southern exposure makes it an excellent collector of passive solar energy.

"Upstairs, in the sitting room, the cathedral ceiling extends in from the sunroom, to bind the spaces together. The sunlight in the morning or evening can make this a good spot to read or relax.

"The master bedroom is quite large, with several advantageous amenities, including a walk-in closet and a five-piece bathroom. After a hard day's work, these items are much appreciated.

CONSTRUCTION TECHNIQUES

"Wood frame construction was decided on for its practicality. The method of wall construction was chosen to provide an insulated structure, a protected uninterrupted vapor barrier and an economical solution. This solution comprises inexpensive 38 x 89 studs and 38 x 64 horizontal strapping, with the vapor barrier applied between stud and strapping. This allows the vapor barrier to be protected from puncture; while still conforming to the 1/3-2/3 rule which states: vapor barrier on warm side of insulation, no more than 1/3 of the total cross-sectional R-value into the wall. Glasclad insulates the structure and protects it from air leakage and moisture damage. It comes complete with an air retarder, which (when taped) does not require additional material. The brick ties serve two purposes: securing the brick cladding; and serving as a fastener for the Glasclad, in place of costly fasteners.

"The header spaces between the floors are filled with 50 millimetre Type IV extruded polystyrene insulation caulked in place. It serves as both a thermal insulator and as part of the vapor barrier.

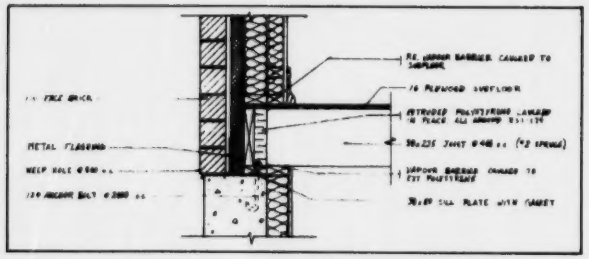
"For the sake of simplicity, the insulation in the basement walls is on the inside. The framing is non- load-bearing, so inexpensive No. 2 or No. 3 grade 38 x 89 studs can be used. Rafters with ceiling joists were selected for the roof, to facilitate a cathedral ceiling in the sunspace.

MECHANICAL SYSTEM

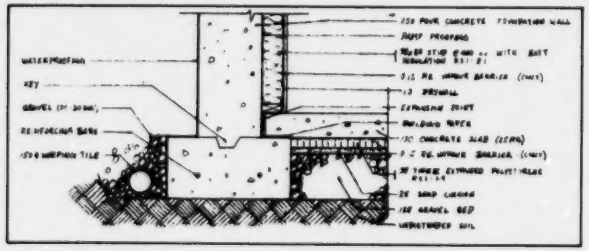
"The best choice for heating the interior space was natural gas. A high-efficiency furnace requires no chimney, only an exhaust pipe. Similarly, an electric hot water heater was chosen instead of gas, because it eliminated the additional construction cost of a chimney. The domestic hot-water heater is provided with a heat trap, as illustrated in the drawings. Without a trap, the hot-water heater constantly heats and reheats the water, even if it is not being used. The highest-efficiency heat recovery ventilator is used.

"The temperature in the sunroom can fluctuate without affecting the comfort level of the main living unit. The room, which has a floor of quarry tile on a concrete slab, is designed as a solar heat collector, with warm air removed by a collector duct when the room temperature rises above 20°C. The air is circulated through the house with the aid of the two-speed furnace motor.

"In short, this sunroom system is simple and totally automatic, with the owner having only to switch the system from summer to winter and open the low-level windows when the room is venting in the summer. These windows cannot be motorized, because of the security problems of open windows when the house is unoccupied."



WALL DETAIL



BASEMENT DETAIL

JUDGES' CRITIQUE

All the jurors except one liked this design, and all liked the presentation. The design's uniqueness was appreciated for being pleasant yet conservative.

The orientation (using the north entry with a south back yard) was well thought out although the west-of-south orientation was difficult to understand. The east of south up to 20 degrees would have been better. Although it was felt that there would be overheating late in the day, it was pointed out that this could be overcome mechanically. It would have been better to show on the mechanical drawings the evidence of how the heat was going to be taken mechanically from the sunroom into the rest of the house, including the control system to be used.

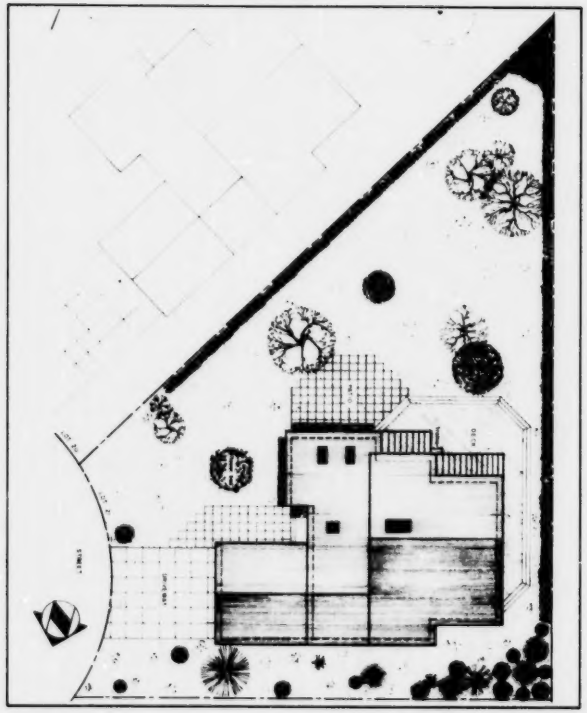
Since the HOTCAN showed 4300 kWh under budget, it may have been advisable to add some windows on the north side to improve the appearance. HOTCAN could have been utilized better as a design tool. The design did not show combustion air details for the single fireplace, but all in all, it was an excellent submission.

JOSEPH CHEUNG
ATTILA FOGARASI

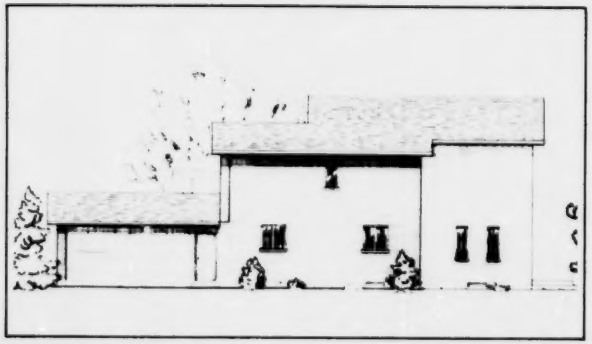
JOSEPH and ATTILA are both Architectural Technology students at George Brown College in Toronto.

JOSEPH CHEUNG was born in Hong Kong in 1964, and moved with his family to Toronto when he was six years old. Following high school, he studied civil engineering at Ryerson, then enrolled in George Brown's Drafting Technician program. Cheung is now in his graduate year in the school's Architectural Technology program.

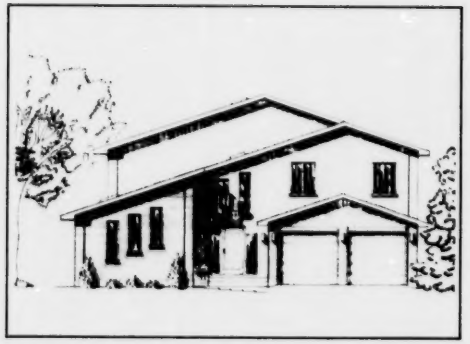
ATTILA FOGARASI was born in Hungary in 1963, and has lived in Toronto since 1979. An enjoyment of drawing and high school drafting courses led to his enrolling in George Brown's Drafting Technician program in 1983. He is now in his final year. "After I graduate," he says, "I'm planning to get a drafting position in an architect's office, where I can learn more about the trade. That would eventually help me to develop a small business partnership in a drafting/design office."



SITE PLAN

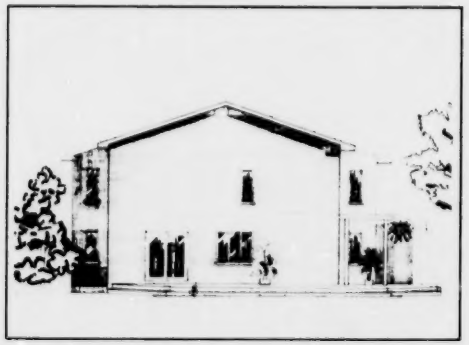


NORTH ELEVATION



EAST ELEVATION

SOUTH ELEVATION



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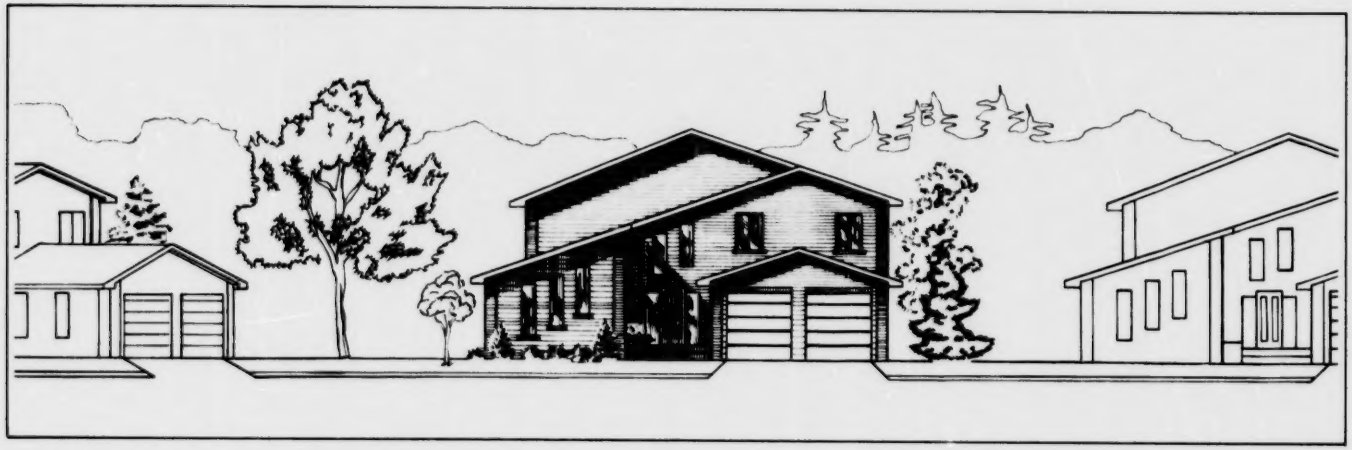


STREET SCAPE

JUDGES' CRITIQUE

The design in this submission was competent and attractive. The presentation was above average but the perspective was not conceived very well. There was no north sign on the plan which made the orientation difficult to determine. The floor plan was complicated with excess circulation areas creating small and difficult shaped rooms, which would hamper buildability. However, the streetscape has a certain undeniable "curb" appeal. Overall, a good effort.

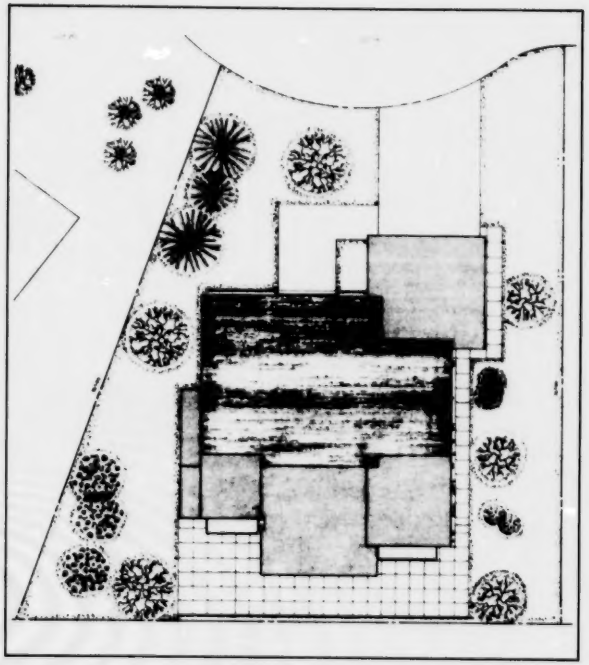
HONORABLE MENTIONS

BENNY DOMINGOS
DUSAN LUKIC

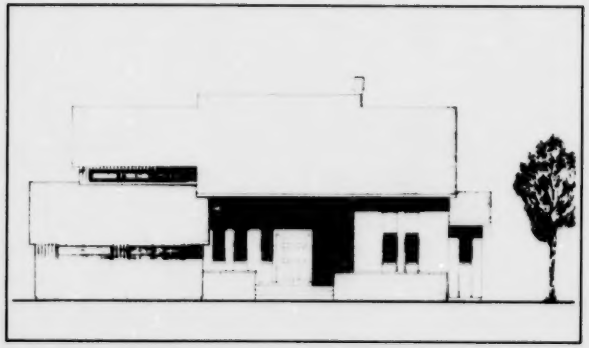
BENNY and DUSAN are students in the Architectural Technology program at George Brown College in Toronto.

BENNY DOMINGOS was born in Caldas da Rainha, Portugal, in 1966, and moved to Toronto a year later. The son of a carpenter, Domingos plans to support himself by working as an architectural draftsman, while studying architecture in university.

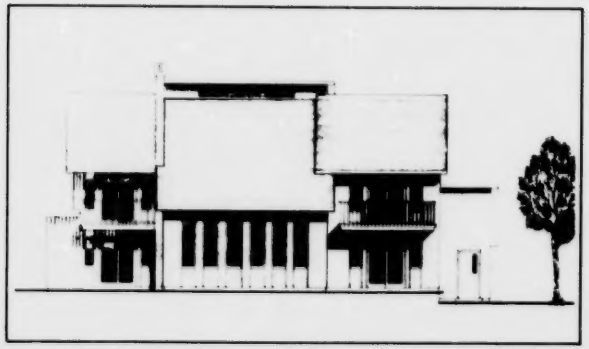
DUSAN was born in Belgrade, Yugoslavia, in 1962, and came to Toronto in 1967. A graduate of George Brown's architectural technician's program, he returned to the school after working for three years in industry. Dusan eventually intends to start his own renovation company.



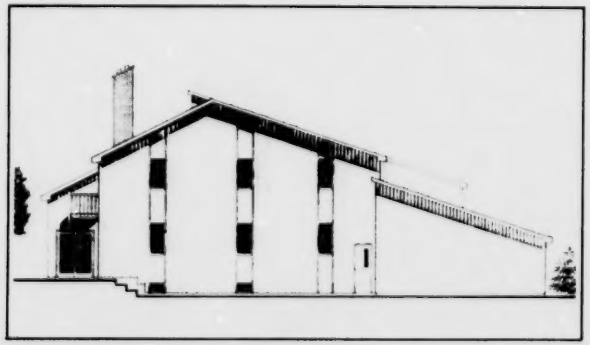
SITE PLAN



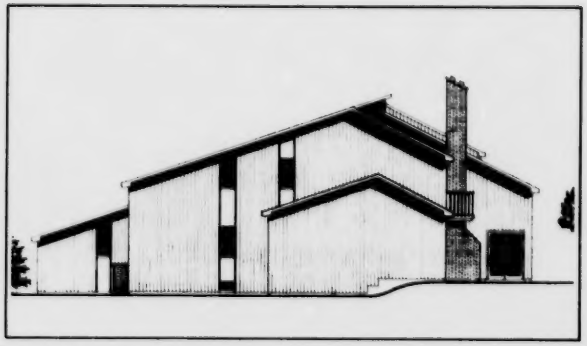
NORTH ELEVATION



SOUTH ELEVATION

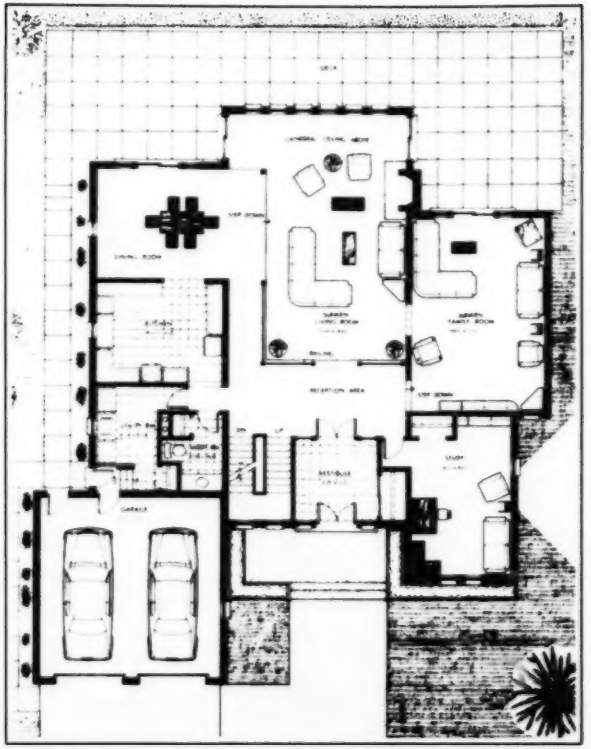


EAST ELEVATION

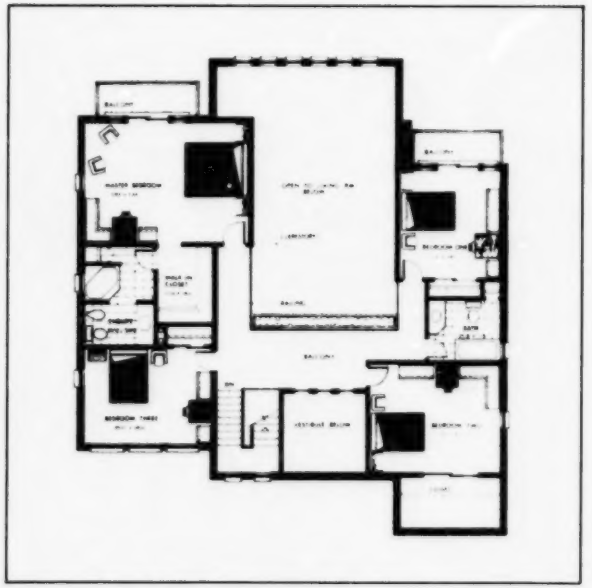


WEST ELEVATION

BASEMENT PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

JUDGES' CRITIQUE

The presentation and plan details in this submission were well received by the judges.

The working drawings were excellent containing lots of detail. The use of baseboard heaters along with a ventilation system was a questionable feature. If one were to run ductwork around the house, perhaps installing an electric furnace and using the distribution system for ventilation would be better and would also reduce costs.

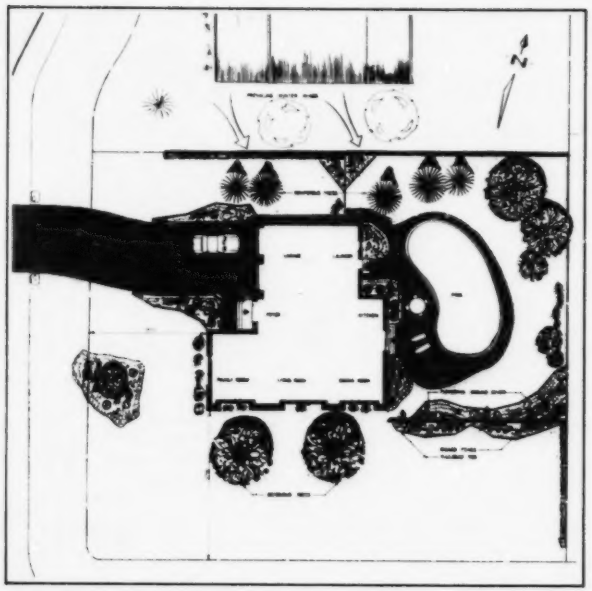
The floor plan was conventional, but very marketable and easy to construct. The actual appearance of the house received mixed reviews from the jury but may be fine for a middle of the road market. Although more innovation would have been appreciated, the overall presentation is commendable.

PETER HAATS

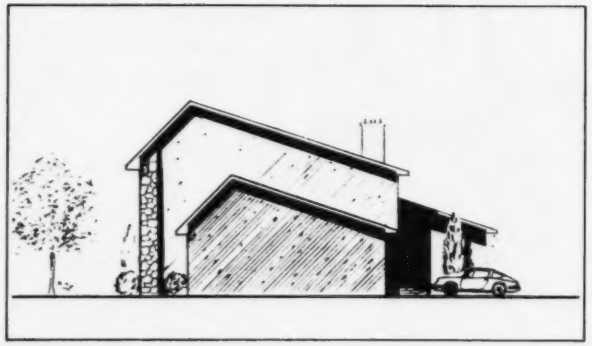
PETER is an Architectural Technology student at Humber College in Toronto.

PETER HAATS attended secondary school in Midland, Ontario, and took the architectural drafting course in Grades 11 and 12, achieving the highest mark in the class each year. He also did a few residential working drawings and renderings on the side. At the end of his second year at Humber, he began working for the firm of J.P. Conforzi & Associates, doing a wide variety of drawings, including large, light industrial projects and custom house designs.

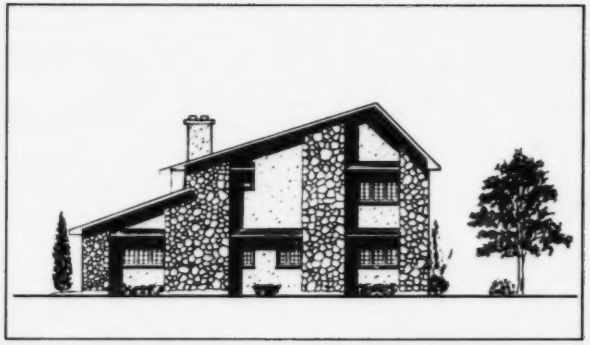
"I still do small projects on the side, but mainly I've been concentrating on the R-2000 Student Design Competition. At the end of this school year, I plan to work for any architectural firm that will hire me, in order to get as much experience in the field as I can," he says.



SITE PLAN

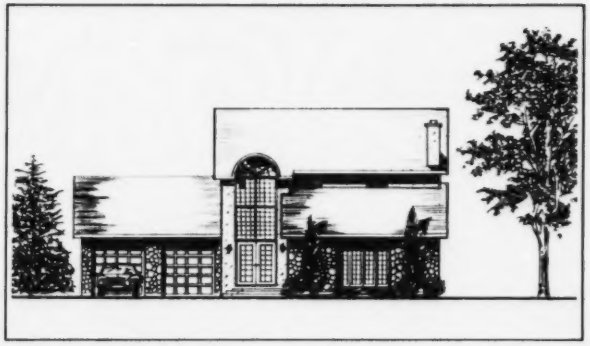


NORTH ELEVATION

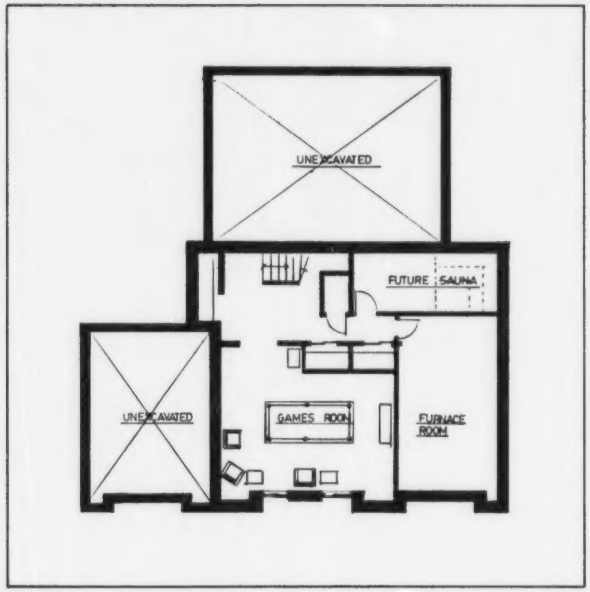


SOUTH ELEVATION

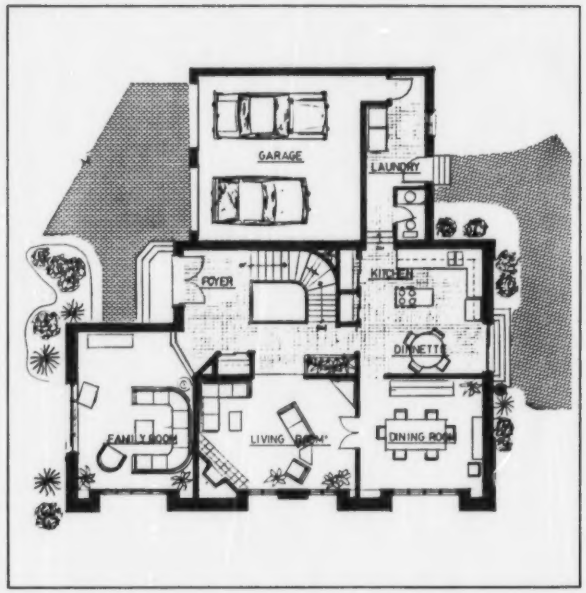
EAST ELEVATION



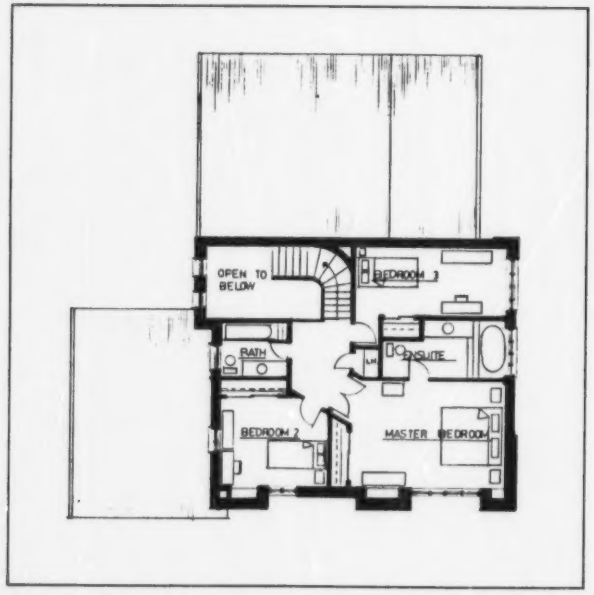
WEST ELEVATION



BASEMENT PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

JUDGES' CRITIQUE

The design was typical of many in the competition. The one oddly shaped window did not seem to improve the appearance and may not meet Building Code requirements.

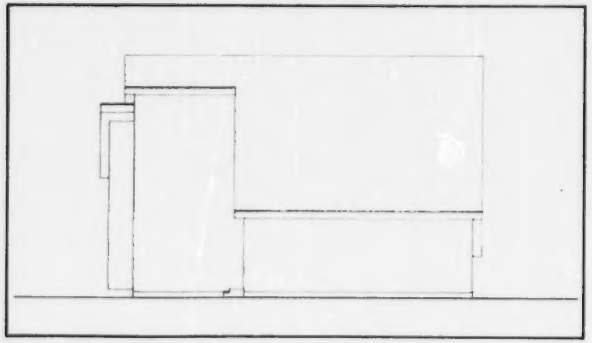
A strong point, as far as the jury was concerned was that the garage did not dominate the front perspective of the house. The floor plan raised some comments on the location of the family room at the front with the dining room at the pool. This was questionable in terms of marketability and perhaps livability. There was very little closet space in the master bedroom. Also, there was no airlock at either entry. However, the jurors appreciated the attempt to design a compact house which was more difficult than larger ones. The presentation was very well done.

GREGORY A. PHILIP

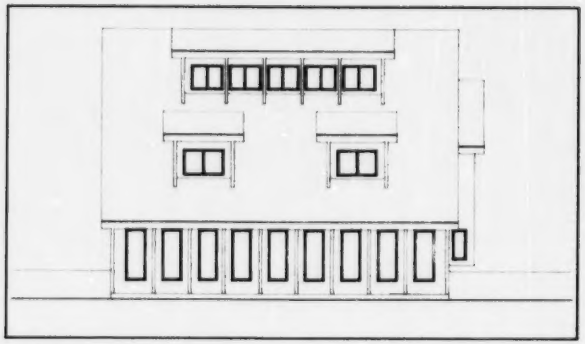
GREGORY is a second-year student in Architectural Technology at the Sault College of Applied Arts and Technology.

After graduation, he plans to return home to the Oshawa/ Lindsay area to further his knowledge and expertise in architecture, particularly in energy-efficient housing and computer-aided design. In his limited spare time, Philip enjoys motorcycling, golf and hunting.

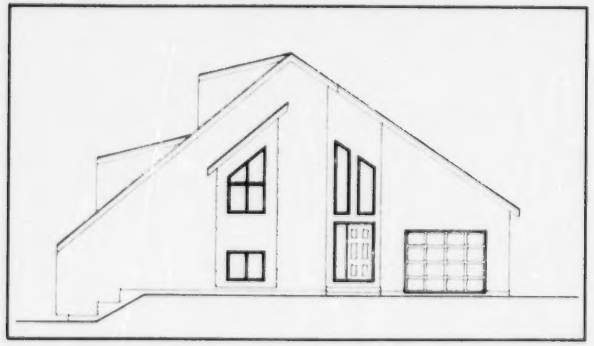
STREET SCAPE



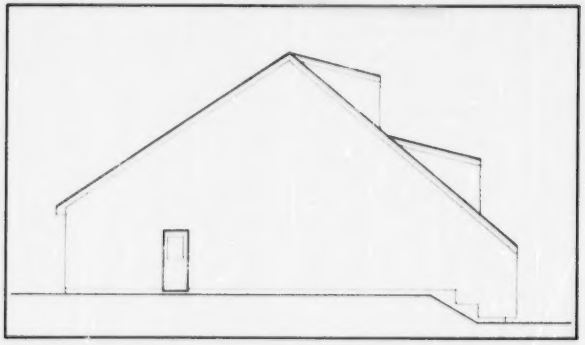
NORTH ELEVATION



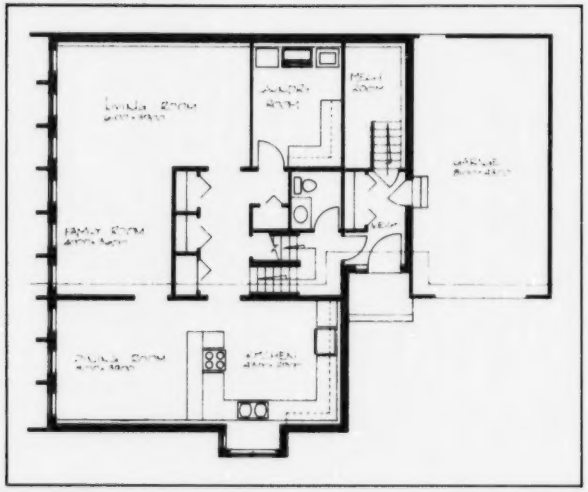
SOUTH ELEVATION



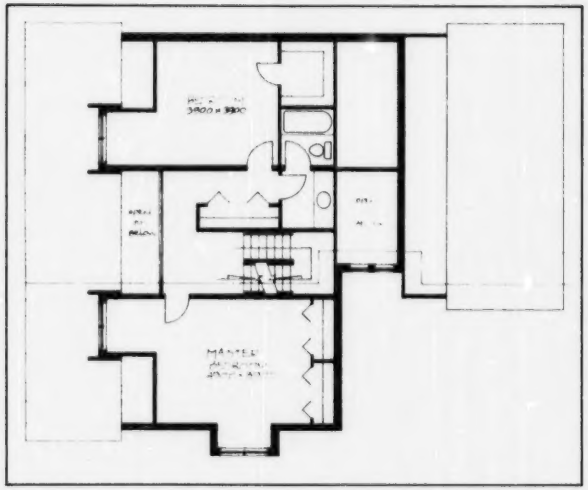
EAST ELEVATION



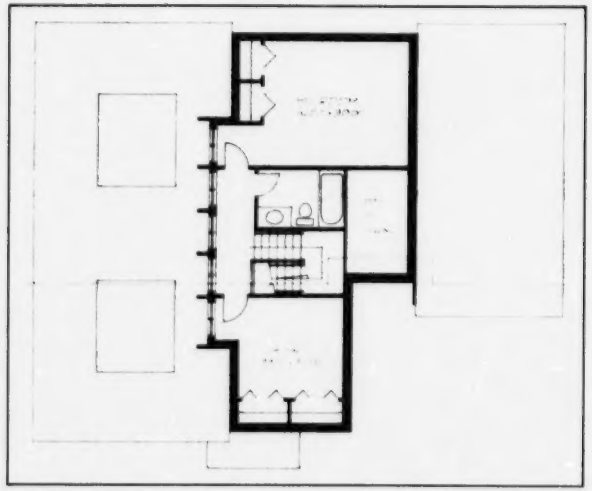
WEST ELEVATION



FIRST FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN

JUDGES' CRITIQUE

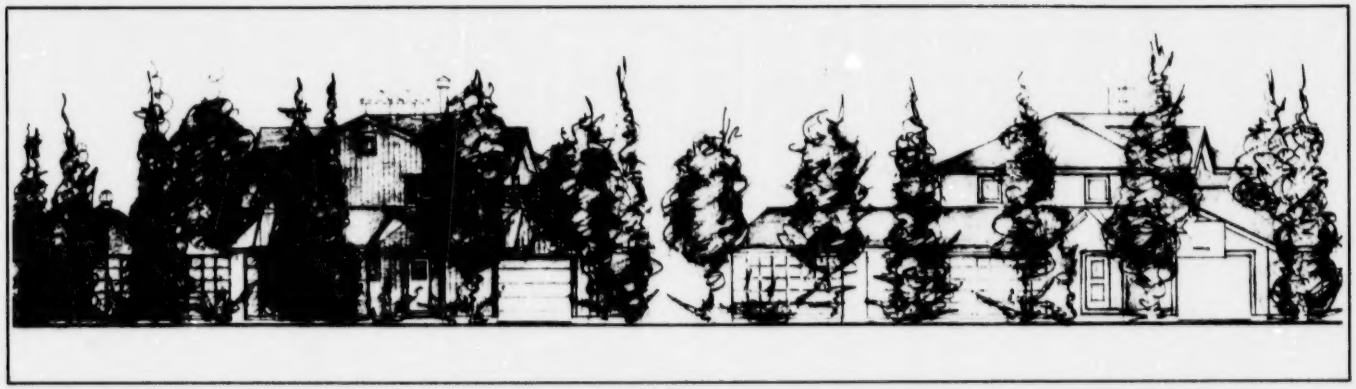
This submission and the presentation were average with above-average detailing, except for the mechanical system which lacked a narrative or specifications. The vestibule area was tight and the entry circulation was awkward. The double-height space at the vestibule would take some getting used to by the occupants. The absence of a north sign on the plan made the orientation difficult to determine. A simpler, more direct presentation, with fewer sheets, might have been better.

However, the jury felt the above-average detailing would be an asset during construction. Overall, a competent, efficient design.

BOB SIMS

BOB is a student at the University of Waterloo's School of Architecture.

BOB SIMS completed his third year at the University of Waterloo in the fall of 1986. He is now in his third-year work term in London, England. Sims has worked as a whitewater rafting guide on the Ottawa River, and is a former freestyle kayaking competitor and champion. He has also been a canoeing instructor and enjoys Alpine skiing.



STREET SCAPE

NORTH ELEVATION

SOUTH ELEVATION

EAST ELEVATION

WEST ELEVATION

PERSPECTIVE VIEW

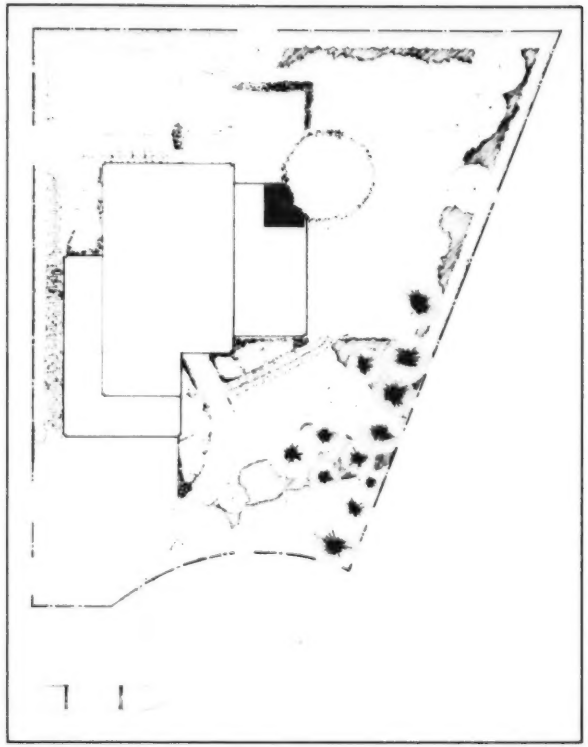
JUDGES' CRITIQUE

This design had an interesting uniformity of style. The south side faced into the back yard and the entrance off the street on the north side was a good choice of orientation. This aspect, including the integration of the landscaping, was handled quite well. The choice of a single-car garage alleviated the problem of the garage taking over the whole front elevation of the building. However, this would also limit the marketability of the house.

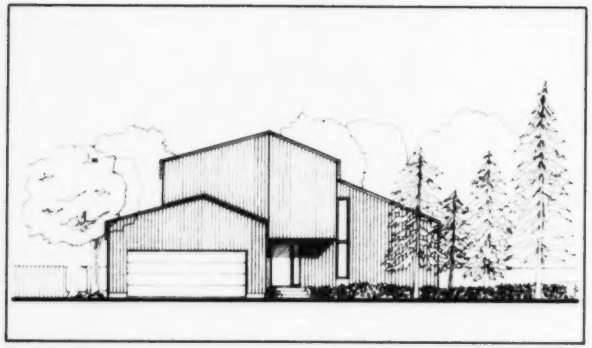
The floor plan was simple but quite workable. The drawings were adequate with very good detailing particularly of the vapor barrier. However, all the jurors commented on the poor layout and untidiness of the presentation which detracted from the otherwise good design.

ALAIN LAVOIE

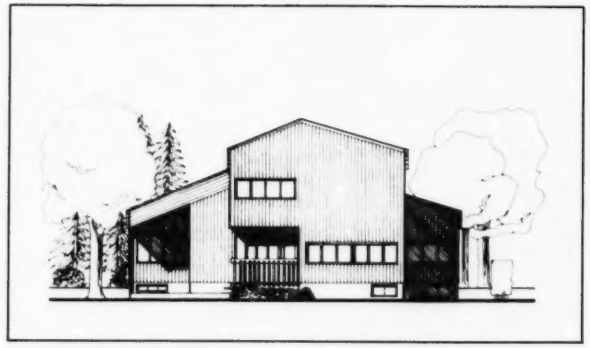
ALAIN LAVOIE, a graduate of the Ecole Secondaire de Casselman, in Casselman, Ontario, is a third-year student in the Architectural Technology program at Algonquin College, Ottawa. His work experience includes labor at a construction site and a stint as a draftsman at an architectural design services office in Embrun, Ontario. In the fall of 1986, he served as guide at an R-2000 open house in L'Original, Ontario.



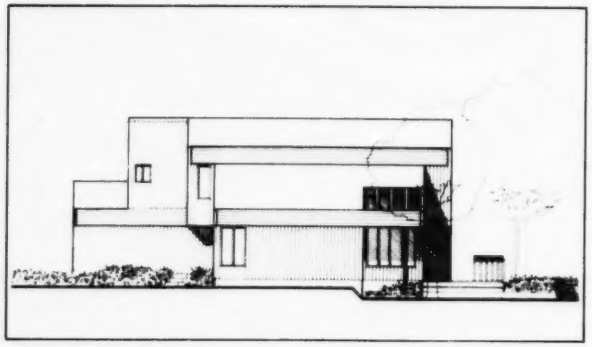
SITE PLAN



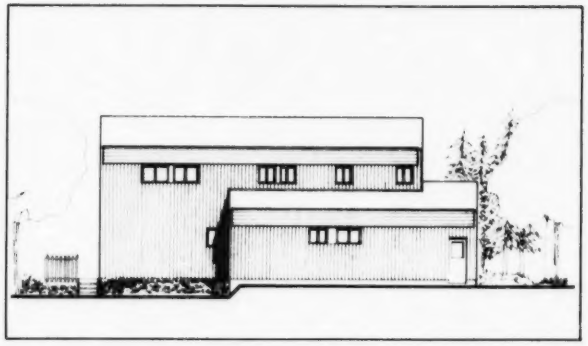
NORTH ELEVATION



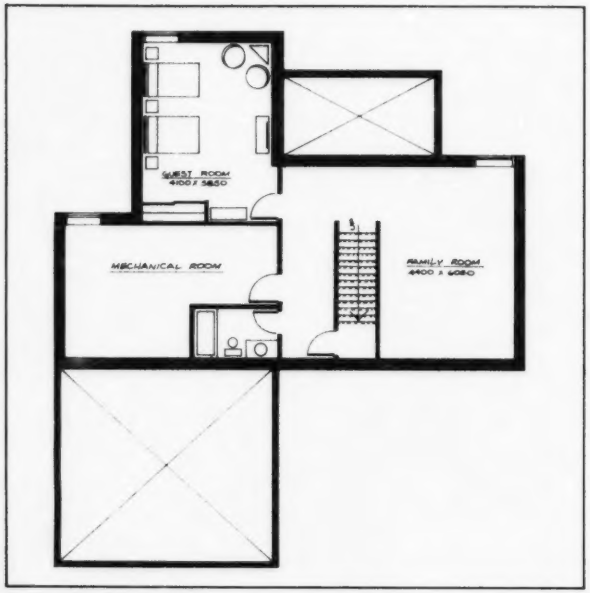
SOUTH ELEVATION



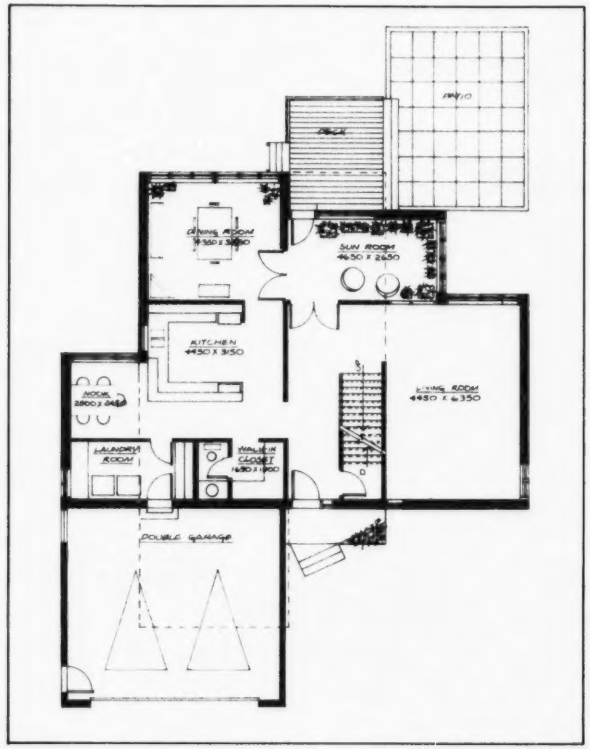
EAST ELEVATION



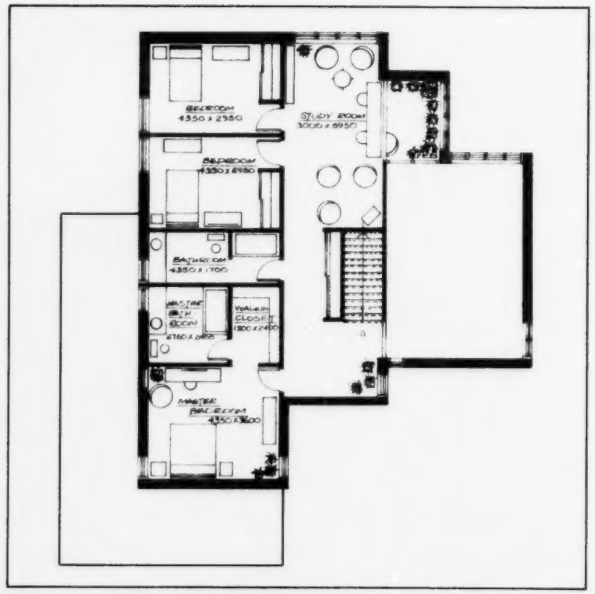
WEST ELEVATION



BASEMENT PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

JUDGES' CRITIQUE

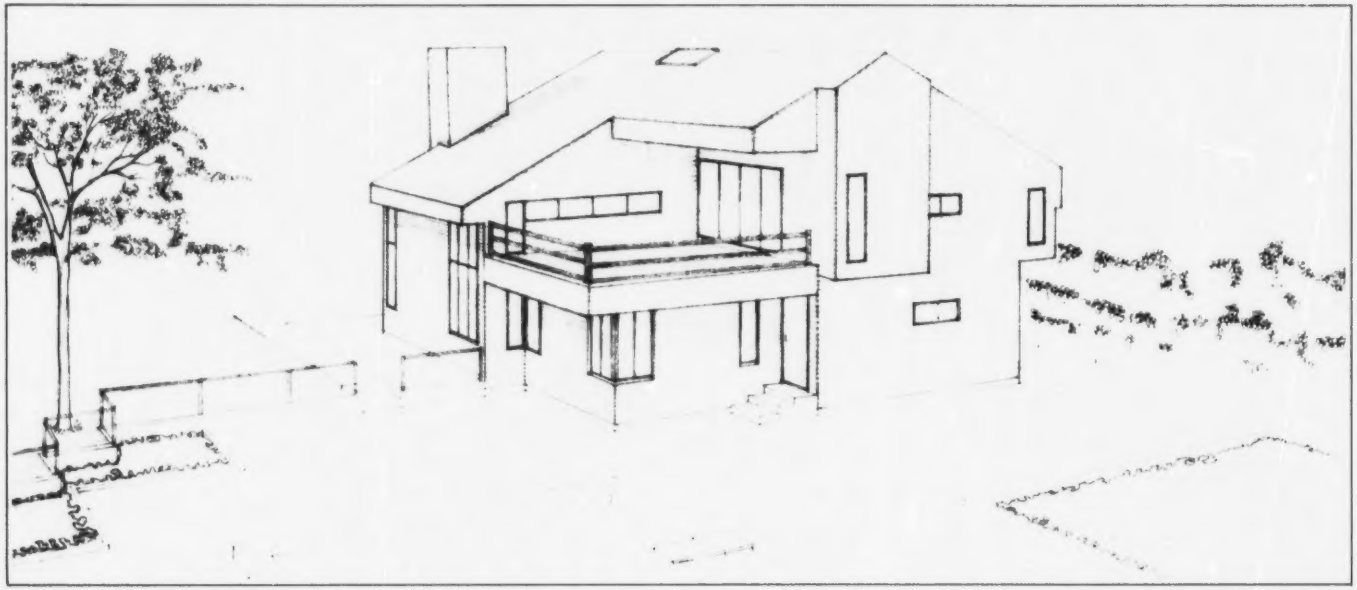
The judges could not agree on the aesthetic appeal of this submission which some thought was better than average. Two judges did not like the heavy massing while one found it rather pleasing.

The presentation was average and perhaps did not show off the design to its best advantage. The plan had a high proportion of circulation space and no vestibule which might affect its marketability. The mechanical drawing lacked description or narrative, and the plan did not have a north sign which made the orientation difficult to determine.

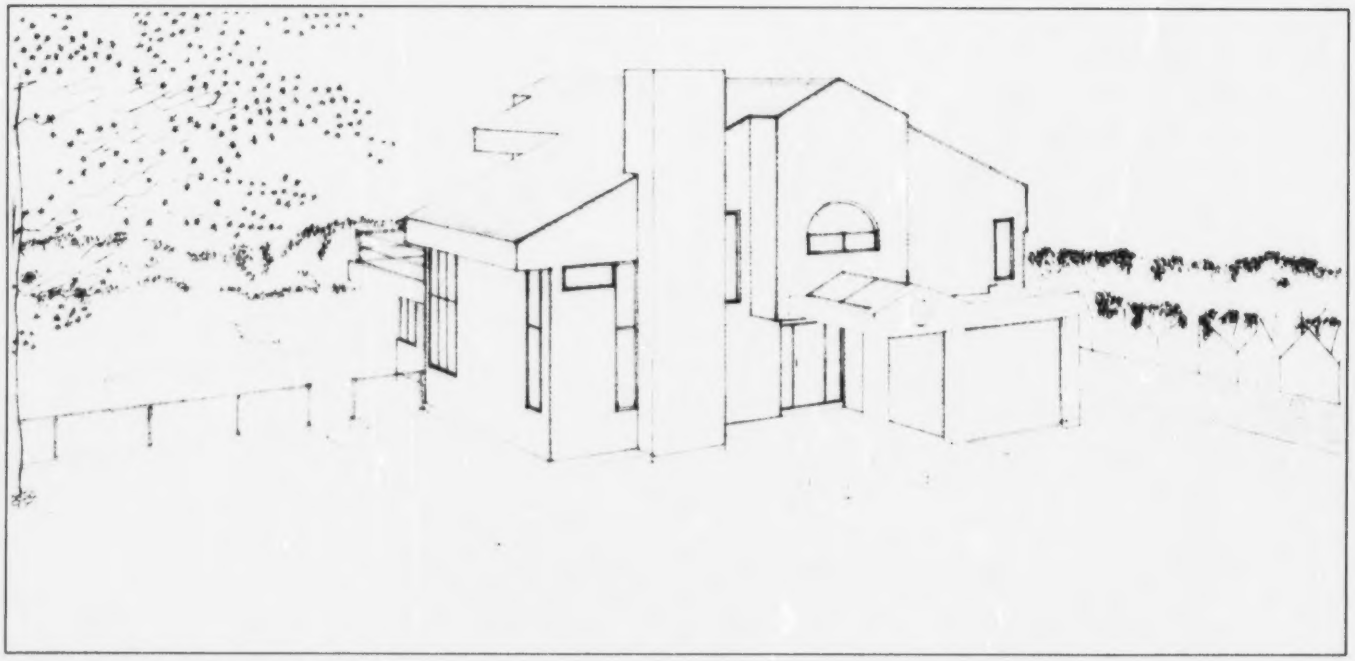
From a technical point of view, the vapour barrier details were very well done and would be an asset for the trades during construction.

TINH NGUYEN

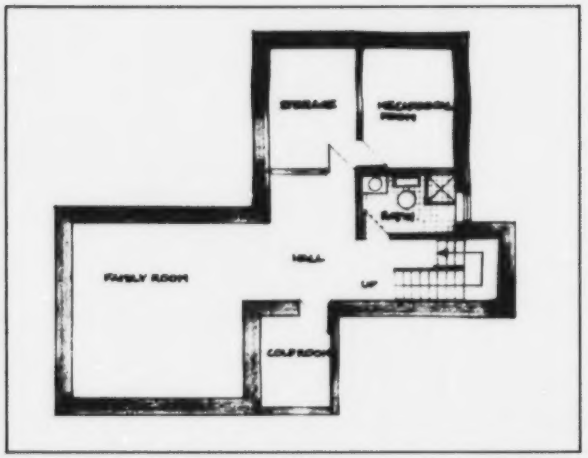
TINH NGUYEN was born in Vietnam and completed high school there. He graduated from Algonquin College in Ottawa as an architectural technician in June 1985. He is now in Algonquin's Architectural Technology program, and expects to graduate in June 1987.



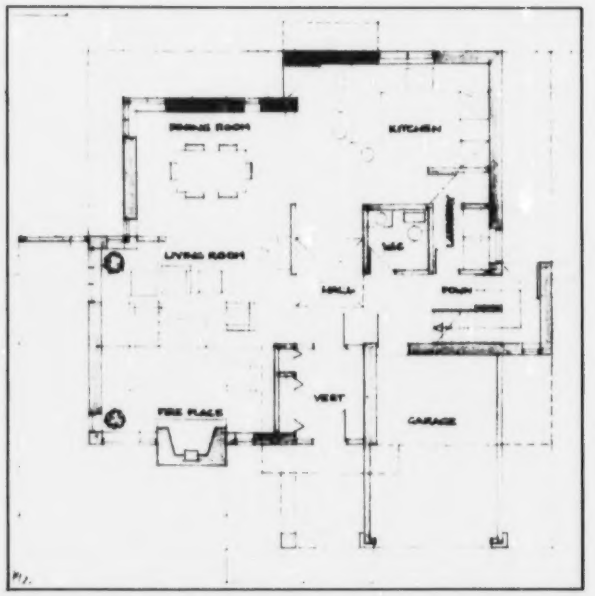
SOUTH/WEST PERSPECTIVE VIEW



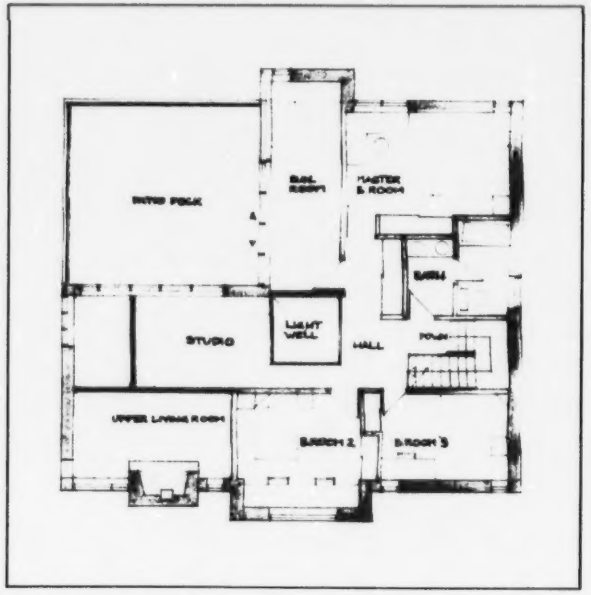
SOUTH/EAST PERSPECTIVE VIEW



BASEMENT PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

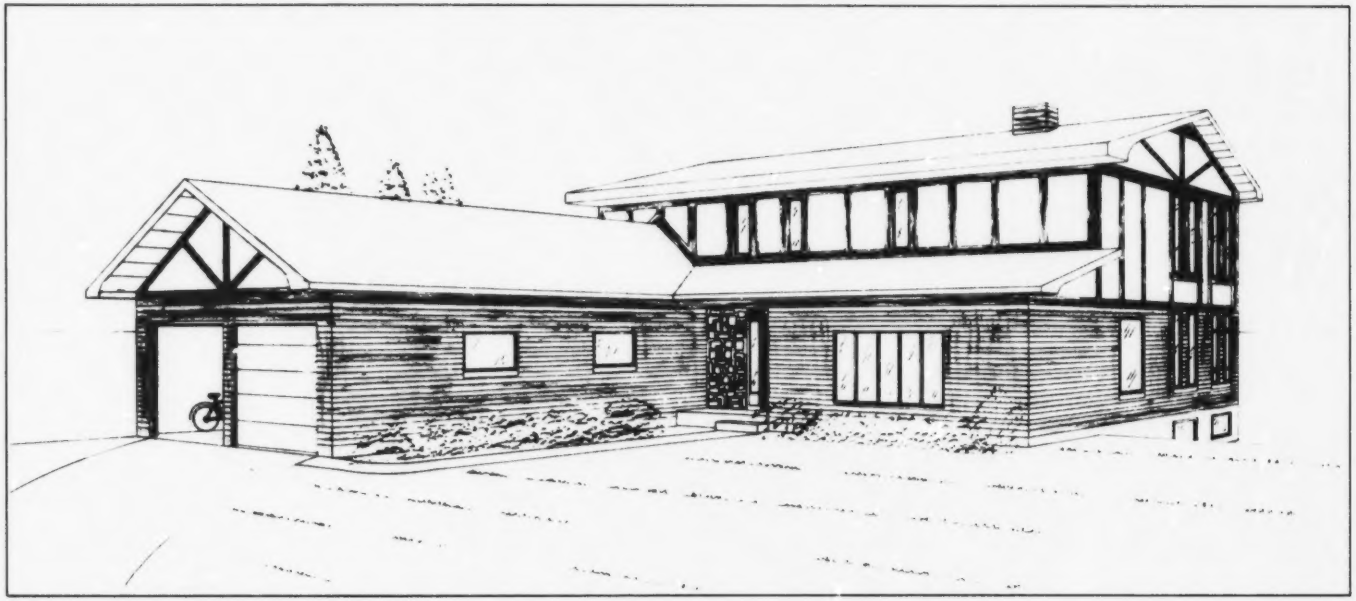
JUDGES' CRITIQUE

This submission was significantly under the HOTCAN budget. Perhaps more could have been done in using this data to improve the aesthetic detailing such as adding more windows. All judges felt the house was possibly more difficult to build than was necessary. The forced air heating system could have been better designed, and details on the fireplace were lacking. The small bedrooms and narrow studio also distracted from the plan.

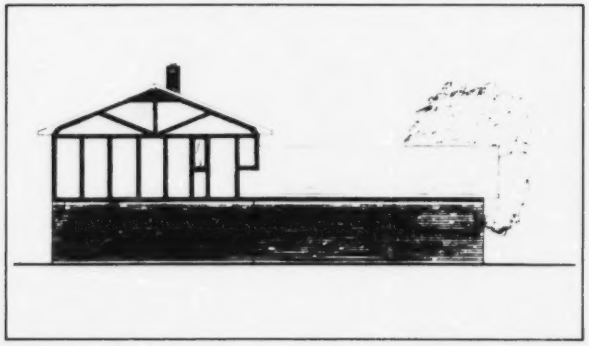
However, the site plan was well thought out and presented. Being significantly under the HOTCAN budget, this design would deliver very low fuel bills. All in all, an above average design.

LOUIS MAILLOUX
BILL MASON

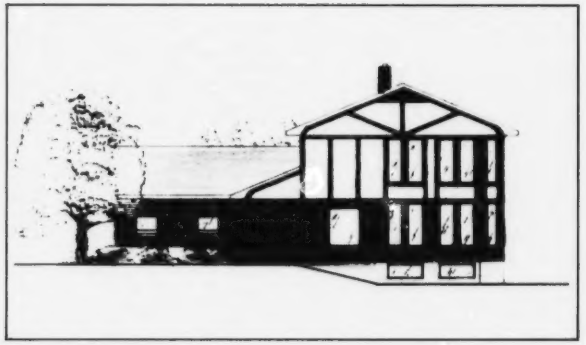
LOUIS and BILL are both students in the Architectural Technology program at St. Clair College in Windsor, Ontario. Louis Mailloux, a Windsor native, lists winter sports as his favorite hobby. Bill Mason was born in Chatham, Ontario, and says his favorite pastimes are music and sports.



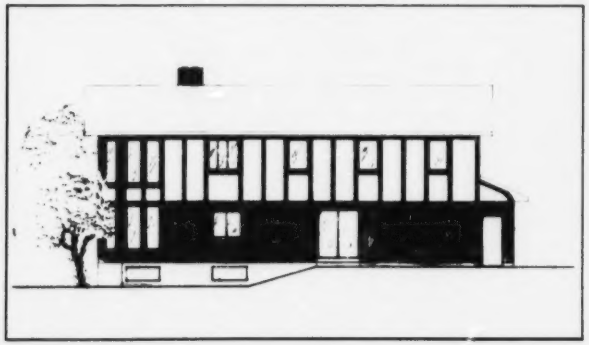
PERSPECTIVE VIEW



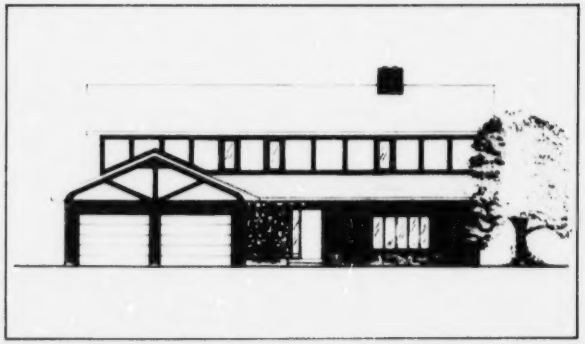
NORTH ELEVATION



SOUTH ELEVATION



EAST ELEVATION



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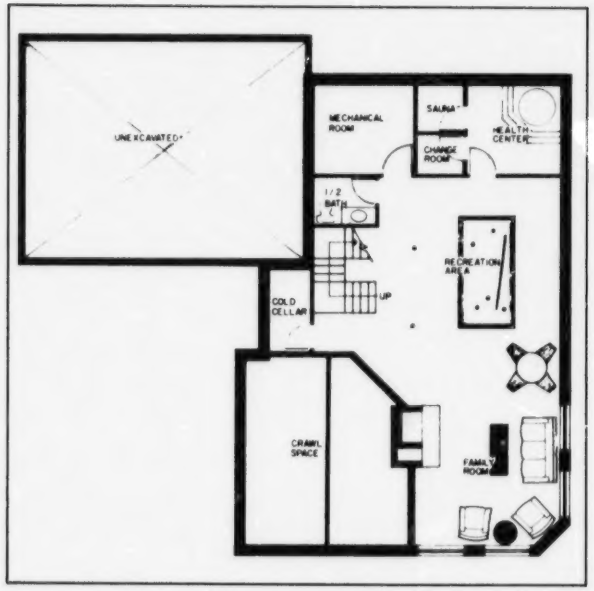
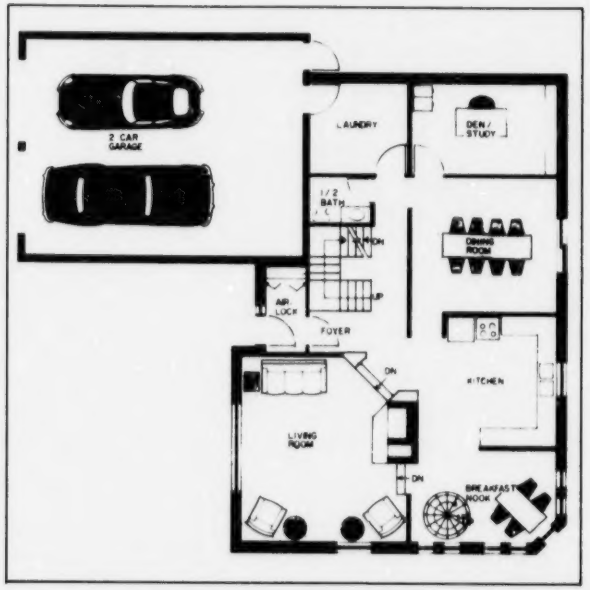
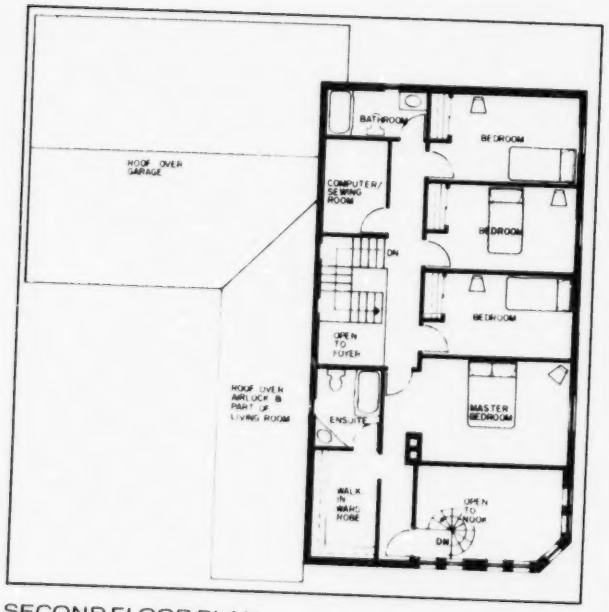


BASEMENT PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

JUDGES' CRITIQUE

This submission was an above average if prosaic design. Its simplicity is a strong asset in terms of buildability. In attempting to achieve double height spaces, the upstairs became somewhat cramped, detracting from the ambiance.

Good presentation drawings indicated the site plan used orientation to maximum advantage. This was a good effort.